

Table 2.2-??
Summary of Portland Harbor PRGs by RAO and Media
 Portland Harbor Superfund Site
 Portland, Oregon

	HUMAN HEALTH														ECOLOGY							
	RAO 1			RAO 2					RAO 3		RAO 4		RAO 5		RAO 6				RAO 7		RAO 8	
	Direct Contact			Fish and Shellfish Consumption					Drinking Water/Direct Contact		Drinking Water/Direct Contact		Direct Contact/Ingestion		Biota (Prey) Ingestion				Direct Contact/Ingestion		Direct Contact/Ingestion	
COCs	Units	Beach	Sediment	Units	Tissue	Sediment	Units	Surface Water	Units	Surface Water	Units	Groundwater	Units	Sediment	Units	Sediment	Units	Surface Water	Units	Surface Water	Units	Pore Water
Persistent																						
Total PCBs	ug/kg		370	ug/kg	0.3	0.1	ug/L	0.0000064	ug/L	0.5	ug/L	0.5	ug/kg	64	ug/kg	31	ug/L	0.014	ug/L	0.19	ug/L	NA
Dioxin/Furan (2,3,7,8-TCDD Eq)	ug/kg		0.01	ug/kg	0.000006	0.00002	ug/L	0.00000000051	ug/L	0.00003	ug/L	0.00003			ug/kg	0.0034		0.001	ug/L	0.001	ug/L	NA
Hydrocarbons																						
Total cPAH (BaP Eq)	ug/kg	12	106	ug/kg	0.05	3,950	ug/L	0.0018	ug/L	0.2	ug/L	0.2										
Total PAH													ug/kg	23,000	ug/kg	NA			ug/L	NA	ug/L	Note 6
Total LPAH													ug/kg	1,500					ug/L	12	ug/L	12
Total HPAH													ug/kg-%fines	150,000					ug/L	0.014	ug/L	0.014
TPH (C-10 to C-12 aliphatic)													ug/kg	3,900							ug/L	2.6
TPH (C-10 to C-12 aromatic)													ug/kg	11,000							ug/L	2.6
Pesticides																						
Aldrin				ug/kg	0.06	0.6	ug/L	0.000005	ug/L	0.004					ug/kg	139			ug/L	3		
Dieldrin				ug/kg	0.06	0.07	ug/L	0.0000054	ug/L	0.0015					ug/kg	62			ug/L	0.056		
DDE													ug/kg	31	ug/kg	7.1						
Total DDX				ug/kg	3	7	ug/L	0.000031 ⁴	ug/L	0.2 ⁷	ug/L	0.2 ⁷	ug/kg	63	ug/kg	101	ug/L	0.001 ⁷	ug/L	0.011	ug/L	0.011
gamma-HCH (Lindane)										ug/L	0.2	ug/L	0.2	ug/kg	5				ug/L	0.08	ug/L	NA
Total Chlorodanes				ug/kg	3	1	ug/L	0.000081	ug/L	2	ug/L	2	ug/kg	18					ug/L	0.0043	ug/L	NA
2,4-D										ug/L	70	ug/L	70						ug/L	NA	ug/L	NA
2,4,5-TP (Silvex)										ug/L	50	ug/L	50						ug/L	NA	ug/L	NA
MCPP										ug/L	12											
Metals																						
Arsenic	mg/kg	0.4	1	mg/kg	0.001	NA	ug/L	2.1 ⁵	ug/L	10	ug/L	10	mg/kg	33					ug/L	190 ^{1,8}	ug/L	NA
Cadmium													mg/kg	5	mg/kg	NA			ug/L	0.09 ^{9,12}		
Chromium										ug/L	100	ug/L	100	mg/kg	111				ug/L	11 ^{2,8}	ug/L	NA
Copper													mg/kg	149	mg/kg	NA			ug/L	2.74		
Lead													mg/kg	128					ug/L	0.54 ^{8,9,13}	ug/L	0.54
Manganese										ug/L	320	ug/L	320								ug/L	120
Mercury				mg/kg	0.03	NA	ug/L	NA	ug/L				mg/kg	1.1	mg/kg	NA			ug/L	0.012	ug/L	NA
Vanadium																					ug/L	20
Zinc												ug/L	4,700	mg/kg	459				ug/L	36.5 ^{8,9,14}	ug/L	36.5
Phthalates																						
BEHP				ug/kg	72	NA	ug/L	NA	ug/L	6			ug/kg	135	ug/kg	NA			ug/L	3		
Butyltins																						
TBT													mg/kg	3.1	mg/kg	NA			ug/L	0.063		
SVOCs																						
1,2-Dichlorobenzene									ug/L	600	ug/L	600							ug/L	14	ug/L	14
Hexachlorobenzene				ug/kg	0.6	0.04	ug/L	0.000029	ug/L	1	ug/L	1							ug/L	NA	ug/L	NA
Pentachlorophenol						130	ug/L	0.03	ug/L	1	ug/L	1							ug/L	13 ³	ug/L	NA
VOCs																						
Benzene									ug/L	5	ug/L	5									ug/L	130
Chlorobenzene									ug/L	100	ug/L	100									ug/L	64
Chloroform									ug/L	80	ug/L	80									ug/L	28
1,1-Dichloroethene (1,1-DCE)									ug/L	2.4	ug/L	2.4									ug/L	25
cis-1,2-Dichloroethene (c-1,2-DCE)									ug/L	70	ug/L	70									ug/L	590
Ethylbenzene									ug/L	700	ug/L	700							ug/L	7.3	ug/L	7.3
Tetrachloroethylene (PCE)									ug/L	5	ug/L	5									ug/L	NA
Trichloroethylene (TCE)									ug/L	5	ug/L	5									ug/L	47
Toluene									ug/L	1,000	ug/L	1,000									ug/L	9.8
1,1,1-Trichloroethane (TCA)									ug/L	200	ug/L	200									ug/L	NA
Vinyl chloride									ug/L	2	ug/L	2									ug/L	NA
o-Xylene									ug/L	190	ug/L	190									ug/L	13
m- and p-Xylene									ug/L	190	ug/L	190									ug/L	67
Total Xylene									ug/L	10,000	ug/L	10,000									ug/L	13
Other																						
PBDE				ug/kg	26	NA	ug/L	NA	ug/L	NA												
Cyanide									ug/L	200	ug/L	200							ug/L	5.2 ¹⁰	ug/L	5.2
Perchlorate									ug/L	15	ug/L	15									ug/L	9300
Toxicity																						
Benthic Toxicity	<p>Chironomus dilutus 10-day survival: survival > 84% Chironomus dilutus 10-day biomass: biomass > 82% of the laboratory negative control biomass Hyalella azteca 28-day survival: survival > 79% Hyalella azteca 28-day biomass: biomass > 66% of the laboratory negative control biomass</p> <p>In addition to having survival or biomass values lower than the above PRG percentages, each individual sample with survival or biomass lower than its respective PRGs must have survival or biomass statistically significantly lower than that of the laboratory negative control sediment response, as determined using either a one-tailed parametric t-test, or a one-tailed non-parametric Mann-Whitney U test (sometimes referred to as the Wilcoxon rank sum test or WRS test, either name is fine), with a statistical significance level of p < 0.05. Survival/biomass and statistical significance tests must both fail before an individual sample is considered to have exceeded a toxicity based PRG.</p>																					

Footnotes:

- 1 This value is for total Arsenic (Arsenic III + Arsenic V).
- 2 This value is for Chromium VI.
- 3 The value for pentachlorophenol is expressed as a function of pH, and is calculated as follows: CCC=exp(1.005(pH)-5.134). Value based on pH=7.8.
- 4 This value is for the 4-4' isomer of either DDE or DDT; 0.000031 ug/L is the value for the 4-4' DDD isomer.
- 5 The arsenic criteria are expressed as total inorganic arsenic. The "water + organism" criterion is based on a risk level of 1 x 10⁻⁴.
- 6 Anthracene = 0.73 ug/L; Benzo(a)anthracene = 0.027 ug/L; Benzo(a)pyrene = 0.014 ug/L; 2-methylnaphthalene = 2.1 ug/L; Naphthalene = 12 ug/L.
- 7 This value is for 4,4'-DDT and its metabolites (i.e., the total concentration of DDT and its metabolites should not exceed this value).
- 8 This value is for the dissolved fraction.
- 9 This is a hardness dependent metal. All values were calculated based on 25 mg/l of CaCO₃.
- 10 This value is expressed as free cyanide (CN)/L.
- 11 This value expressed as total cyanide (CN)/L.
- 12 The value for cadmium is calculated as follows: CCC=(exp(0.7409*ln(hardness)-4.719))*(1.101672-(ln(hardness)*0.041838))
- 13 The value for lead is calculated as follows: CCC=(exp(1.273*ln(hardness)-4.705))*(1.46203-(ln(hardness)*0.145712))
- 14 The value for zinc is calculated as follows: CCC=(exp(0.8473*ln(hardness)+0.884))*0.986

NA Value not available.

COCs	RAO 1		RAO 2		
	Beach	Sediment	Tissue	Sediment	Surface Water
Persistent					
Total PCBs	--	R	R	B	A1
Dioxin/Furan (2,3,7,8-TCDD Eq)	--	R	R	R	A1
Hydrocarbons					
Total cPAH (BaP Eq)	R	R	R	R	A1
Total PAH	--	--	--	--	--
Total LPAH	--	--	--	--	NA
Total HPAH	--	--	--	--	NA
TPH (C-10 to C-12 aliphatic/aromatic)	--	--	--	--	--
Pesticides					
Aldrin	--	--	R	R	A1
Dieldrin	--	--	R	R	A1
Total DDX	--	--	R	R	A1
gamma-HCH (Lindane)	--	--	--	--	A1
Total Chlordanes	--	--	R	R	A1
2,4-D	--	--	--	--	A1
2,4,5-TP (Silvex)	--	--	--	--	A1
MCPP	--	--	--	--	NA
Metals					
Arsenic	B	B	R	NA	A1
Cadmium	--	--	--	--	--
Chromium	--	--	--	--	NA
Copper	--	--	--	--	--
Lead	--	--	--	--	--
Manganese	--	--	--	--	NA
Mercury	--	--	R	NA	NA
Vanadium	--	--	--	--	--
Zinc	--	--	--	--	--
Phthalates					
BEHP	--	--	R	NA	A1
Butyltins					
TBT	--	--	--	--	--

SVOCs					
1,2-Dichlorobenzene	--	--	--	--	A1
Hexachlorobenzene	--	--	R	B	A1
Pentachlorophenol	--	--	--	--	A1
VOCs					
Benzene	--	--	--	--	A1
Chlorobenzene	--	--	--	--	A1
Chloroform	--	--	--	--	A1
1,1-Dichloroethene/1,1-Dichloroethylene (1,1-DCE)	--	--	--	--	A1
cis-1,2-Dichloroethene/cis-1,2-Dichloroethylene (c-1,2-DCE)	--	--	--	--	NA
trans-1,2-Dichloroethene/trans-1,2-Dichloroethylene (t-1,2-DCE)	--	--	--	--	A1
Ethylbenzene	--	--	--	--	A1
Tetrachloroethylene (PCE)	--	--	--	--	A1
Trichloroethylene (TCE)	--	--	--	--	A1
Toluene	--	--	--	--	A1
1,1,1- Trichloroethane (TCA)	--	--	--	--	NA
Vinyl chloride	--	--	--	--	A1
o-Xylene	--	--	--	--	NA
m- and p-Xylene	--	--	--	--	NA
Total Xylene	--	--	--	--	NA
Other					
PBDE	--	--	R	NA	NA
Cyanide	--	--	--	--	A1
Perchlorate	--	--	--	--	NA
Toxicity					
Benthic Toxicity	--	--	--	--	

- R Risk-based threshold or TRV from BERA
- R2 Regional Screening Level for Tap Water (Nov 2013)
- B Background
- A1 ARAR - Based on Oregon WQS Table 40 (organism + v
- A2 ARAR- MCL (Nov 2013)
- A3 ARAR - Based on Oregon WQS Table 30 (chronic or a
- A4 ARAR - National Water Quality Criteria for Aquatic Lif

RAO 3	RAO 4	RAO 5	RAO 6		RAO 7	RAO 8
Surface Water	Groundwater	Sediment	Sediment	Surface Water	Surface Water	Pore Water
A1	A2	R	R	A3	R	NA
A1	A2	--	R		A4	NA
A2	A2	--	--		--	--
--	--	R	--		NA	R
A2	A2	R	--		R	R
A2	A2	R	--		R	R
--	--	R	--		--	R
R2	--	R	--		A3	--
R2	--	R	--		A3	--
R2	R2	R	--	A3	R	R
A2	A2	R	--		A3	NA
A2	A2	R	--		A3	NA
A2	A2	--	--		NA	NA
A2	A2	--	--		NA	NA
R2	--	--	--		--	--
A2	A2	--	--		A3	NA
--	--	R	--		A3	--
A2	A2	R	--		A3	NA
--	--	R	--		R	--
--	--	R	R		A3	R
R2	R2	--	--		--	R
--	--	--	--		A3	R
--	--	--	--		--	R
--	A2	R	--		A3	R
A2	--	R	--		R	--
--	--	R	--		A3	--

A2	A2	--	--		R	R
A2	A2	--	--		NA	NA
A2	A2	--	--		A3	NA
A2	A2	--	--		--	R
A2	A2	--	--		R	R
A2	A2	--	--		R	R
A2	A2	--	--		--	R
A2	A2	--	--		--	R
A2	A2	--	--		--	NA
A2	A2	--	--		R	R
A2	A2	--	--		A4	NA
A2	A2	--	--		R	R
A2	A2	--	--		--	R
A2	A2	--	--		--	NA
A2	A2	--	--		NA	NA
R2	R2	--	--		--	R
NA	NA	--	--		--	R
A2	A2	--	--		--	R
NA	--	--	--		--	--
A1	A2	--	--		A3	R
A2	A2	--	--		--	R
--	--	R	--		--	--

water)

cute when chronic not available) - April 10, 2014

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